

Tennis elbow

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Tennis elbow or **lateral epicondylitis** is a condition in which the outer part of the elbow becomes sore and tender. It is commonly caused by non-inflammatory, chronic degenerative changes (Enthesopathy) in the tendon that attaches the forearm muscle extensor carpi radialis brevis (ECRB) to the elbow. It is most prevalent in middle age.

Most of the names for this disease are misnomers: **tennis elbow** is a misnomer because most people that get this disease don't play tennis and **lateral epicondylitis** is a misnomer because the pathophysiology does not involve inflammation (it is an -osis,^[1] not an -itis). The disease is idiopathic, benign, and self-limiting.

Runge is usually credited for the first description of the condition, in 1873.^[2] The *term tennis elbow* first appeared in an 1883 paper by Major called *Lawn-tennis elbow*.^{[3][4]}

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Tennis Elbow

Classification and external resources

ICD-10	M77.1 (http://apps.who.int/classifications/icd10/browse/2010/en#/M77.1)
ICD-9	726.32 (http://www.icd9data.com/getICD9Code.aspx?icd9=726.32)
DiseasesDB	12950 (http://www.diseasesdatabase.com/ddb12950.htm)
MedlinePlus	000449 (http://www.nlm.nih.gov/medlineplus/ency/article/000449.htm)
eMedicine	orthoped/510 (http://www.emedicine.com/orthoped/topic510.htm) pmr/64 (http://www.emedicine.com/pmr/topic64.htm#) sports/59 (http://www.emedicine.com/sports/topic59.htm#)
MeSH	D013716 (http://www.nlm.nih.gov/cgi/mesh/2014/MB_cgi?field=uid&term=D013716)



Example of repetitive movement that may cause tennis elbow

Signs and symptoms

- Pain on the outer part of the elbow (lateral epicondyle)
- Point tenderness over the lateral epicondyle—a prominent part of the bone on the outside of the elbow
- Pain from gripping and movements of the wrist, especially wrist extension^[*citation needed*] and lifting movements

- Pain from activities that use the muscles that extend^[*citation needed*] the wrist (e.g. pouring a container of liquid, lifting with the palm down, sweeping, especially where wrist movement is required)
- Morning stiffness^[*citation needed*]

Symptoms associated with tennis elbow include, but are not limited to: radiating pain from the outside of the elbow to the forearm and wrist, pain during extension of wrist^[*citation needed*], weakness of the forearm, a painful grip while shaking hands or torquing a doorknob, and not being able to hold relatively heavy items in the hand. The pain is similar to the condition known as *golfer's elbow*, but the latter occurs at the medial side of the elbow.^[5]

Causes

Early experiments suggested that tennis elbow was primarily caused by overexertion. However, studies show that trauma such as direct blows to the epicondyle, a sudden forceful pull, or forceful extension cause more than half of these injuries.^[6]

Cyriax proposes one explanation of how tennis elbow may come about. The hypothesis states that there are microscopic and macroscopic tears between the common extensor tendon and the periosteum of the lateral humeral epicondyle. An operation conducted in this study showed that 28 out of 39 patients showed tearing at the tendon cuff. Kaplan stated that the radial nerve was significantly involved in tennis elbow. He noted the constriction of the radial nerve by adhesions to the capsule of the radiohumeral joint and the short extensor muscle of the wrist. He found evidence that many differed in how they contracted tennis elbow. Disorders such as calcification of the rotator cuff, bicipital tendinitis, or carpal tunnel syndrome may increase chances of tennis elbow.^[6]

Pathophysiology

The pathophysiology of lateral epicondylitis is degenerative. Non-inflammatory, chronic degenerative changes of the origin of the extensor carpi radialis brevis (ECRB) muscle are identified in surgical pathology specimens.^[7] It is unclear if the pathology is affected by prior injection of corticosteroid.

Tennis players generally believe tennis elbow is caused by the repetitive nature of hitting thousands of tennis balls, which leads to tiny tears in the forearm tendon attachment at the elbow.^[8]

The extensor digiti minimi also has a small origin site medial to the elbow that this condition can affect. The muscle involves the extension of the little finger and some extension of the wrist allowing for adaption to "snap" or flick the wrist—usually associated with a racquet swing. Most often, the extensor muscles become painful due to tendon breakdown from over-extension. Improper form or movement allows for power in a swing to rotate through and around the wrist—creating a moment on that joint instead of the elbow joint or rotator cuff. This moment causes pressure to build impact forces to act on the tendon causing irritation and inflammation.

The following speculative rationale is offered by proponents of an overuse theory of etiology: The extensor carpi radialis brevis has a small origin and does transmit large forces through its tendon during repetitive grasping. It has also been implicated as being vulnerable during shear stress during all movements of the forearm.

While it is commonly stated that lateral epicondylitis is caused by repetitive microtrauma/overuse, this is a speculative etiological theory with limited scientific support that is likely overstated.^[7] Other speculative risk factors for lateral epicondylitis include taking up tennis later in life, unaccustomed strenuous activity, decreased mental chronometry and speed and repetitive eccentric contraction of muscle (controlled lengthening of a muscle group).

Prevention

Another factor of tennis elbow injury is experience and ability. The proportion of players who reported a history of tennis elbow had an increased number of playing years. As for ability, poor technique increases the chance for injury much like any sport. Therefore an individual must learn proper technique for all aspects of their sport. The competitive level of the athlete also affects the incidence of tennis elbow. Class A and B players had a significantly higher rate of tennis elbow occurrence compared to class C and novice players. However, an opposite, but not statistically significant, trend is observed for the recurrence of previous cases, with an increasingly higher rate as ability level decreases.^[5]

Other ways to prevent tennis elbow:

- Decrease the amount of playing time if already injured or feeling pain in outside part of the elbow.
- Stay in overall good physical shape.
- Strengthen the muscles of the forearm: (Pronator quadratus, Pronator teres, and Supinator muscle)—the upper arm: (biceps, triceps, Deltoid muscle)—and the shoulder and upper back (trapezius). Increased muscular strength increases stability of joints such as the elbow.
- Like other sports, use equipment appropriate to your ability, body size, and muscular strength.^[5]

Diagnosis

To diagnose tennis elbow, the physician performs a battery of tests in which he places pressure on the affected area while asking the patient to move the elbow, wrist, and fingers. X-rays can confirm and distinguish possibilities of existing causes of pain that are unrelated to tennis elbow, such as fracture or arthritis. Medical ultrasonography and magnetic resonance imaging (MRI) are other valuable tools for diagnosis but are frequently avoided due to the high cost.^[5] MRI screening can confirm excess fluid and swelling in the affected region in the elbow, such as the connecting point between the forearm bone and the extensor carpi radialis brevis.

Diagnosis is made by clinical signs and symptoms that are discrete and characteristic. With the elbow fully extended, the patient feels points of tenderness over the affected point on the elbow—which is the origin of the extensor carpi radialis brevis muscle from the lateral epicondyle (extensor carpi radialis brevis origin). There is also pain with passive wrist flexion and resistive wrist extension (Cozen's test).^[9]

Depending upon severity and quantity of multiple tendon injuries that have built up, the extensor carpi radialis brevis may not be fully healed by conservative treatment. Nirschl defines four stages of lateral epicondylitis, showing the introduction of permanent damage beginning at Stage 2.

1. Inflammatory changes that are reversible
2. Nonreversible pathologic changes to origin of the extensor carpi radialis brevis muscle
3. Rupture of ECRB muscle origin
4. Secondary changes such as fibrosis or calcification.^[10]

Treatment

Evidence for the treatment of lateral epicondylitis before 2010 was poor.^[11] There were clinical trials addressing many proposed treatments, but the quality of the trials was poor.^[12]

A 2009 study looked at using eccentric exercise with a rubber bar in addition to standard treatment: the trial was stopped after 8 weeks because the improvement using the bar for therapy was so significant.^{[13][14]} Based on small sample size and a follow-up only 7 weeks from commencement of treatment, the study shows short term improvements; long term results are yet to be determined.

In some cases, severity of tennis elbow symptoms mend without any treatment, within six to twenty-four months. However, Tennis elbow left untreated can lead to chronic pain that degrades quality of daily living.^[5]

Physical

There are several recommendations regarding prevention, treatment, and avoidance of recurrence that are largely speculative including stretches and progressive strengthening exercises to prevent re-irritation of the tendon^{[15][16]} and other exercise measures.

Evidence from the Tyler study suggests that eccentric exercise using a rubber bar is highly effective at eliminating pain and increasing strength.^{[13][14]} Highlights of the study were described in The New York Times. (<http://well.blogs.nytimes.com/2009/08/25/phys-ed-an-easy-fix-for-tennis-elbow/>) Described as the "Tyler Twist" (http://www.therabandacademy.com/elements/clients/docs/Tyler%20et%20al%20JSES%202010__201009DD_123442.pdf)^[13] the exercise involves grasping a rubber bar, twisting it, then slowly untwisting it.

Moderate evidence exists demonstrating that joint manipulation directed at the elbow and wrist and spinal manipulation directed at the cervical and thoracic spinal regions results in clinical changes to pain and function.^{[17][18]} There is also moderate evidence for short-term and mid-term effectiveness of cervical and thoracic spine manipulation as an add-on therapy to concentric and eccentric stretching plus mobilisation of wrist and forearm. Although not yet conclusive, the short-term analgesic effect of manipulation techniques may allow more vigorous stretching and strengthening exercises, resulting in a better and faster recovery process of the affected tendon in lateral epicondylitis.^[19]

Low level laser therapy, administered at specific doses and wavelengths directly to the lateral elbow tendon insertions, offers short-term pain relief and less disability in tennis elbow, both alone and in conjunction with an exercise regimen.^[20]

Medication

Topical non-steroidal anti-inflammatory drugs (NSAIDs) may improve pain in the short term.^[21] Evidence for oral NSAIDs is mixed.^[21]

Evidence is poor for an improvement from injections of any type, be it corticosteroids, botulinum toxin, prolotherapy or other substances.^[22] Corticosteroid injection may be effective in the short term^[23] however are of little benefit after a year, compared to a wait-and-see approach.^[24] Complications from repeated steroid injections include skin problems such as hypopigmentation and fat atrophy leading to indentation of the skin around the injection site.^[23] Botulinum toxin type A to paralyze the forearm extensor muscles in those with chronic tennis elbow that has not improved with conservative measures may be reasonable.^[25]

Surgery

In recalcitrant cases, surgery may be an option.^{[26][27]}

Prognosis

Response to initial therapy is common, but so is relapse (25% to 50%) and/or prolonged, moderate discomfort (40%).

Epidemiology

In tennis players, about 39.7% have reported current or previous problems with their elbow. Less than one quarter (24%) of these athletes under the age of 50 reported that the tennis elbow symptoms were "severe" and "disabling," while 42% over 50. More women (36%) than men (24%) considered their symptoms severe and disabling. Tennis elbow is more prevalent in individuals over 40, where there is about a four-fold increase among men and two-fold increase among women. Tennis elbow equally affects both sexes and, although men have a marginally higher overall prevalence rate as compared to women, this is not consistent within each age group, nor is it a statistically significant difference.^[28]

Playing time is a factor in tennis elbow occurrences. However, increased incidence with increased playing time is statistically significant only for respondents under 40. Individuals over 40 who played over two hours had a two-fold increase in chance of injury. Those under 40 had a 3.5 times increase compared to those who played less than two hours per day.^[5]

See also

- Golfer's elbow
- Olecranon bursitis
- Tendinitis
- Tendinosis
- Repetitive strain injury
- Radial tunnel syndrome

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Categories: Inflammations | Overuse injuries | Tennis terminology | Sports medicine | Soft tissue disorders

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